

*This presentation is for illustrative and **general** educational purposes only and is not intended to substitute for the official MSHA Investigation Report analysis nor is it intended to provide the sole foundation, if any, for any related enforcement actions.*

GENERAL INFORMATION

Coal Mine Fatal Accident 2005-16



Operator:	Enterprise Mining Company, LLC
Mine:	Mine #1
Accident Date:	November 4, 2005
Classification:	Electrical
Location:	Dist. 6, Letcher County, Kentucky
Mine Type:	Underground Mine
Production:	2,000 tons coal/day

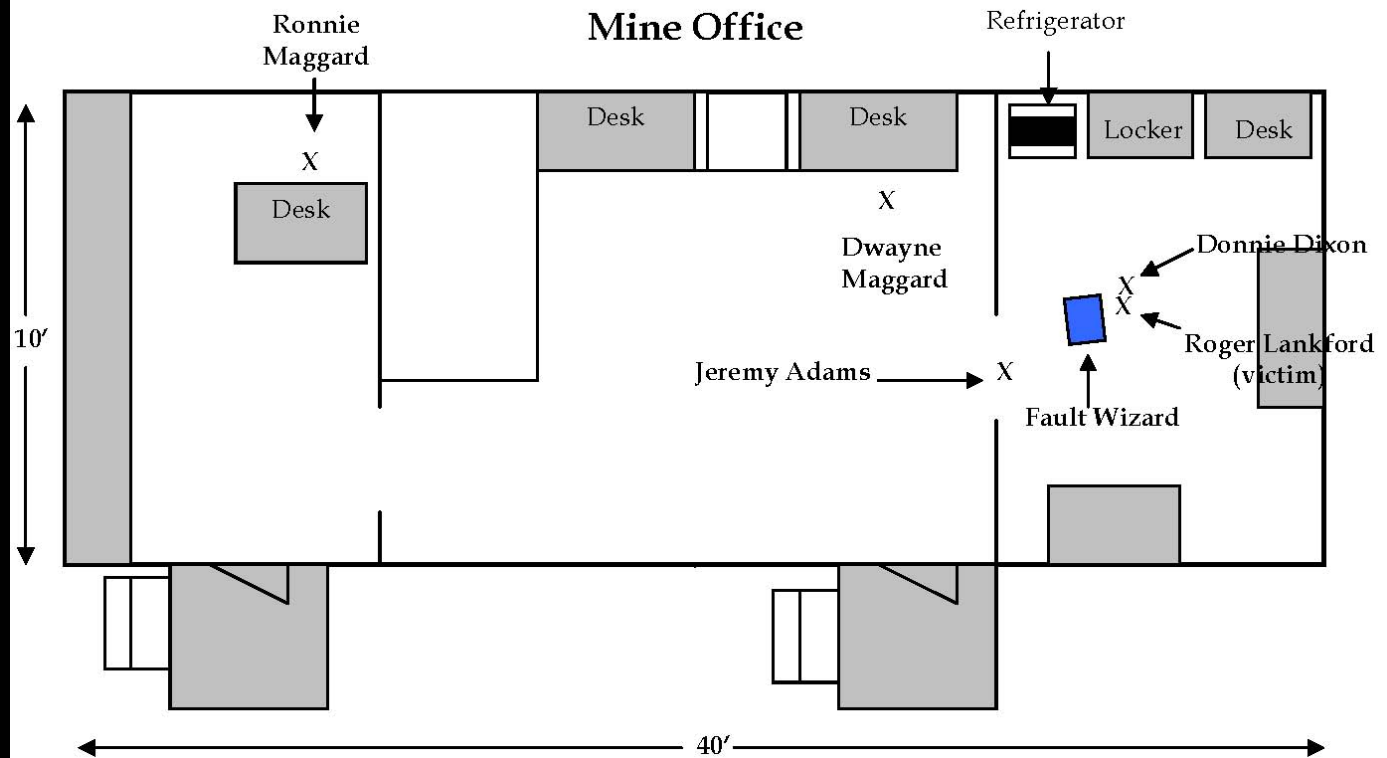
ACCIDENT DESCRIPTION



The circuit breaker protecting the continuous mining machine tripped due to a fault in the trailing cable. The victim and another electrician began the process of locating the fault using a high potential cable tester that was not involved in the accident.

After approximately one and one-half hours of troubleshooting without isolating the fault, the other electrician made arrangements to have the Fault Wizard™ high potential cable tester delivered to the mine. At the time, the tester was located at another mine operated by the company.

ACCIDENT DESCRIPTION



By the time the Fault Wizard™ tester arrived at the mine, the fault in the continuous mining machine trailing cable had already been located. The Fault Wizard™ tester was placed in the mine superintendent's office. The unit was stored under the superintendent's desk and the door to the office was locked.

After repairing the trailing cable, the victim and the other electrician traveled to the surface. Upon reaching the outside, the victim decides to demonstrate the use of the Fault Wizard™ tester with the other electrician and the outside man.

ACCIDENT DESCRIPTION



The tester was not plugged into the electrical outlet in the office. The alligator clip for the grounding cord was lying on the left side of the lid and was unattached. The alligator clip for the black high-voltage output lead was attached to the metallic shorting bar, which was mounted in the lid of the unit. The alligator clip for the red high-voltage output lead was located in the right side of the lid. (It is not clear whether or not the red alligator clip was attached to the shorting bar when the lid was first opened.)

ACCIDENT DESCRIPTION



The victim turned the main power switch on and began demonstrating how to adjust the "Cable VP" setting for various sizes of mining cable. He rotated the "Voltage" control to 10KV and pressed the green "HV Start" button. An electrical arc flashed near the shorting bar mounted in the lid. A few seconds later, the victim pulled his right hand away from the tester and said "it got me". The victim attempted to stand and then collapsed on the floor.

DISCUSSION



The unit is designed for four basic modes of operation. The energy state of the high-voltage output leads in each of the modes is as follows:

Cycle Mode - The capacitor is charged to the selected voltage level when the "HV Start" button is pushed. After the capacitor discharges through the output leads, the capacitor repeatedly charges and discharges with a maximum cycle time of approximately 6 seconds.

DISCUSSION



Hipot Mode - The output leads are energized when the "HV Start" button is pushed. The voltage at the output leads increases as the voltage control is rotated in the clockwise direction. The capacitor is not used in this mode. The output voltage is supplied by the high-voltage DC power supply.

DISCUSSION



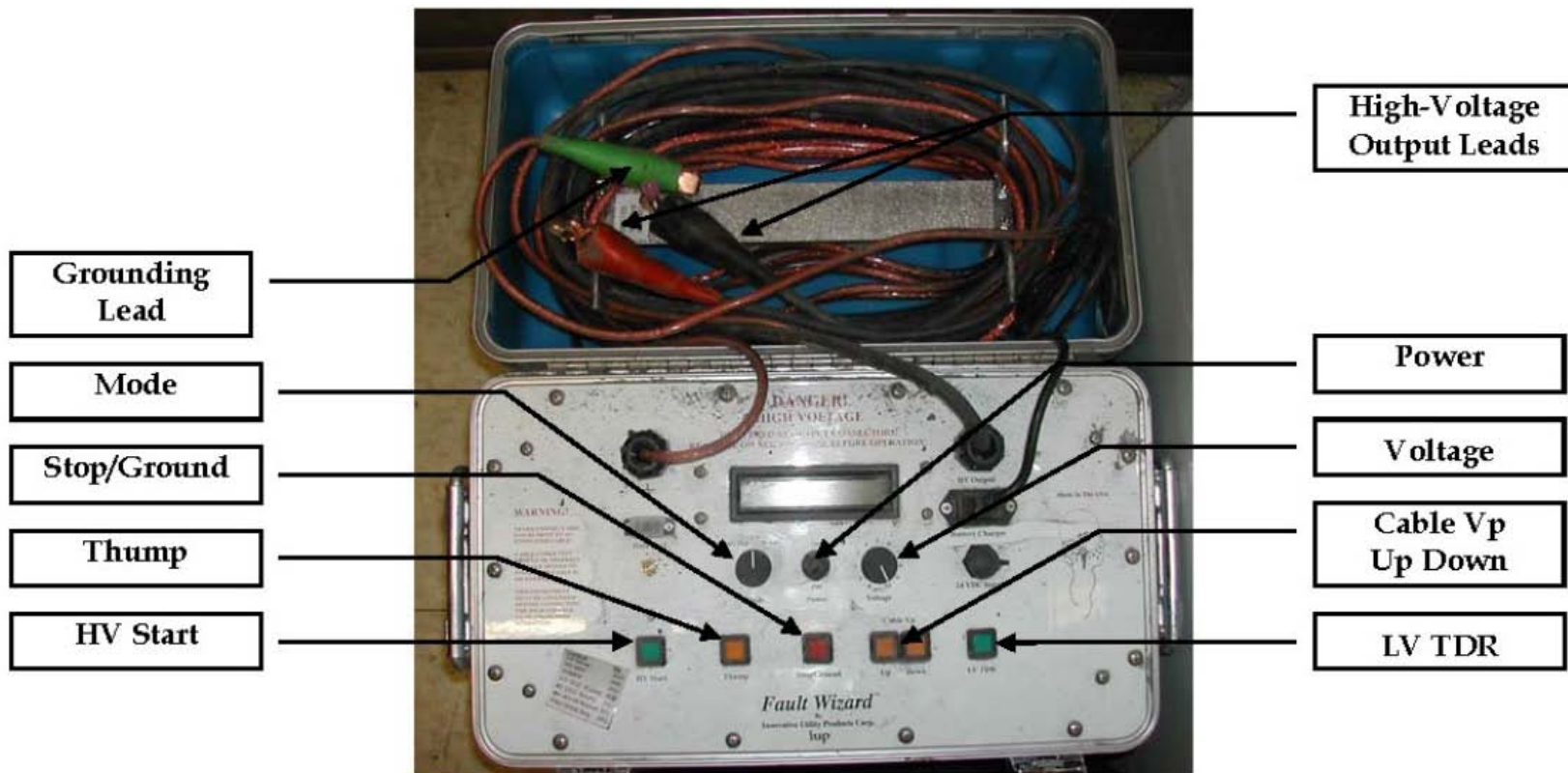
High Voltage Time Domain Reflectometry (TDR) Mode - The "HV Start" button is pushed and the capacitor charges to the selected voltage level, but the output leads are not energized until the "Thump" button is pushed. When the "Thump" button is pushed, the capacitor discharges through the output leads and a low voltage TDR pulse is simultaneously initiated.

DISCUSSION



Low Voltage TDR Mode - A low voltage TDR pulse is generated when the "LV TDR" button is pushed. No high voltage discharge occurs in this mode.

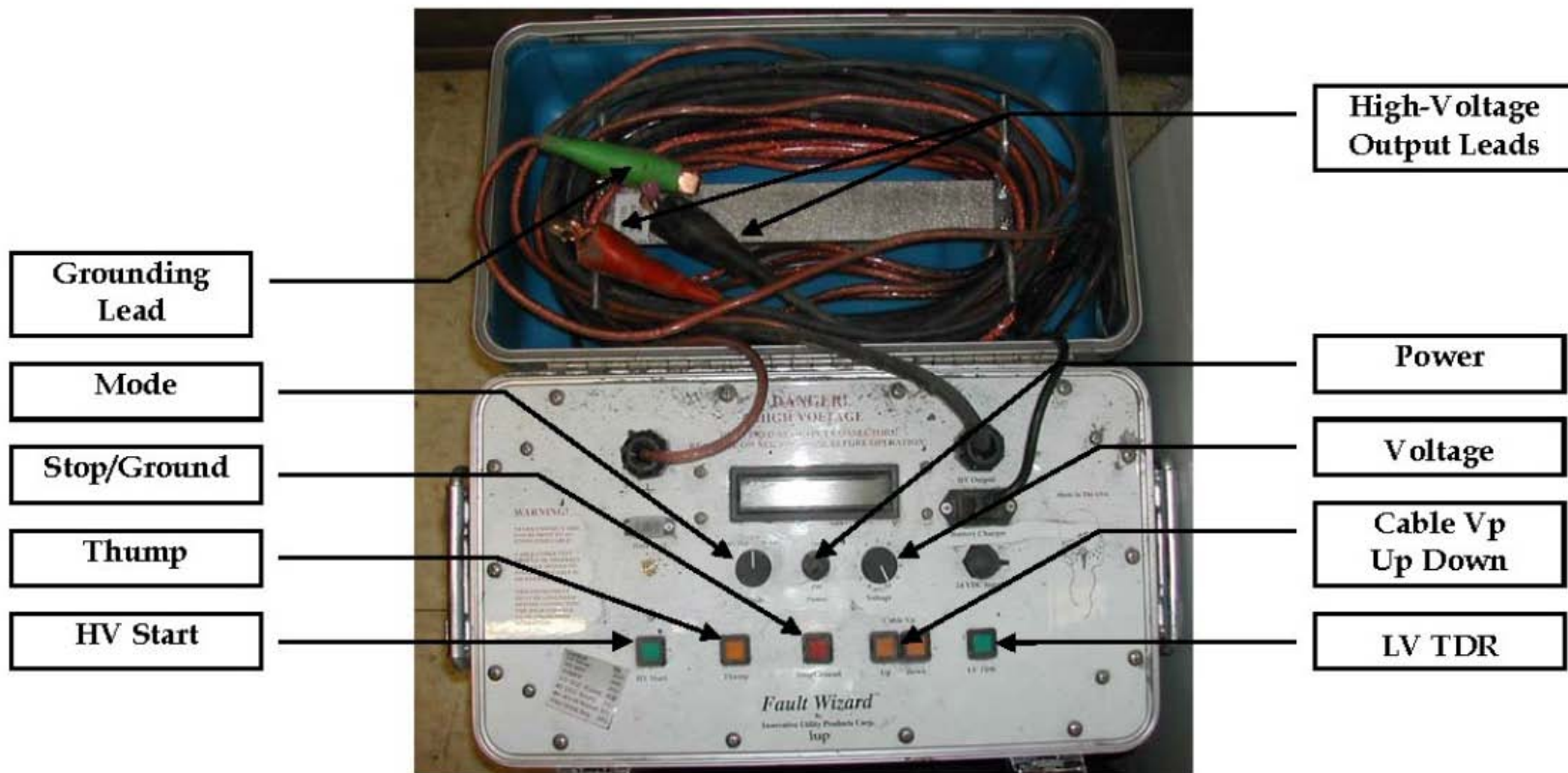
DISCUSSION



Results of Testing by MSHA Approval and Certification Center

The maximum energy available between the red test lead and any point common to the unit's frame ground was calculated as 742 Joules, which would most likely be lethal. (NFPA 70E, 2000 Edition, indicates that capacitive discharges of 50J or greater may cause ventricular fibrillation.)

DISCUSSION



The victim attended a training session conducted on June 10, 2005, in which the operation and use of the tester were demonstrated by a local sales representative. The instructor did not wear high-voltage gloves while operating the tester, nor did he require the students to do so. Also, neither the instruction manual for the tester nor the manufacturer's demonstration video addressed the use of high-voltage gloves while operating the unit. The victim did not use the tester again in the interim period between the training and the accident.

ROOT CAUSE ANALYSIS

Causal Factor: The victim was not wearing high-voltage gloves at the time of the accident.

Causal Factor: The use of high-voltage gloves was not included and demonstrated in the task training given to the victim regarding the safe use of the tester.

Causal Factor: The controls and output leads of the tester were not configured properly to allow a safe demonstration of the unit. The output leads were not connected to a suitable test cable or other load before the unit was energized in "cycle" mode.

Corrective Actions: All of the electricians employed by the company received training, given by the manufacturer's representative, on the safe operation of the tester. The electricians were instructed that the use of high-voltage gloves is mandatory while operating the unit.

ENFORCEMENT ACTIONS

A 104(a) citation was issued for violation of 30 CFR 48.7(c). "On June 10, 2005, the chief electrician for Mine #1 received inadequate task training regarding the safe use of the Fault Wizard high-voltage cable tester. The training session did not cover the use of high-voltage rubber gloves while operating the tester. Based on interviews, it is also evident that neither the person conducting the training nor the persons receiving the training wore rubber gloves while working with the unit during the session. On November 4, 2005, the chief electrician received a fatal electrical shock while demonstrating the operation of the tester to another electrician. He was not wearing high-voltage rubber gloves at the time of the accident."

A 104(a) citation was issued for violation of 30 CFR 77.1710(c). "On November 4, 2005, the chief electrician for Mine #1 received a fatal electrical shock while demonstrating the operation of the Fault Wizard high-voltage cable testing device to another electrician in the mine office. The chief electrician was not wearing high-voltage gloves at the time of the accident."

BEST PRACTICES

- High-voltage testing devices should only be operated by qualified electricians who have received thorough training on the specific model of tester being used.
- Follow the manufacturer's instructions explicitly and keep the owner's manual with the device at all times.
- Wear properly rated high-voltage electrical gloves while operating such devices.
- Properly ground the device before the unit is turned on.
- Ensure that all mine personnel are familiar with the device voltage and current capabilities.
- Store such devices in a secured dry location, accessible only to qualified electricians.